

Product Information

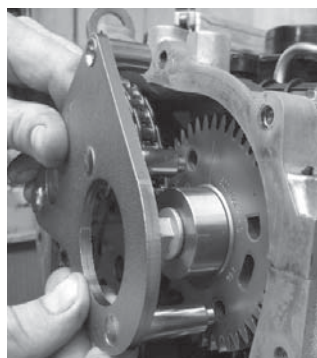


AST4975

Diesel Engine Setting/Locking Tool Kit



IMPORTANT: Always refer to the vehicle manufacturer's service instructions, or proprietary manual, to establish the current procedures and data. Product Information Sets detail applications and use of the tools with any general instructions provided as a guide only.



Applications:

**RENAULT 2.0 dCi Twin Camshaft
CHAIN DRIVE diesel engines in**

RENAULT

Megane	Scenic	Laguna
Vel Satis	Espace	Koleos
Traffic		

Nissan

Quashqui	X-Trail	Primastar
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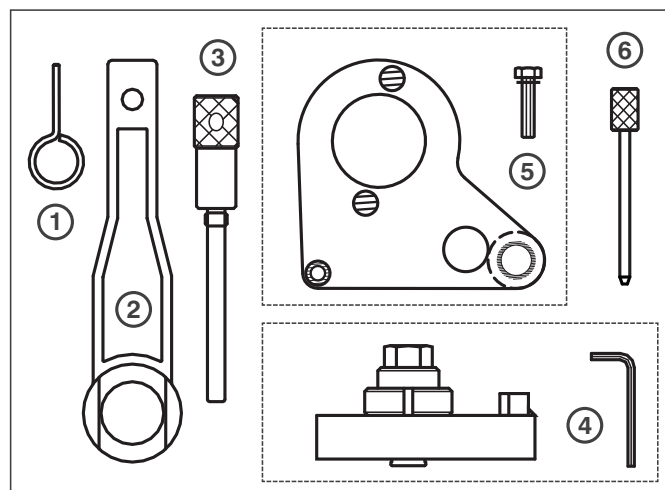
Vauxhall / Opel

Vivaro

M9R engines

Additional AST Tools required:

AST4939 Crank Pulley Holding Tool Handle



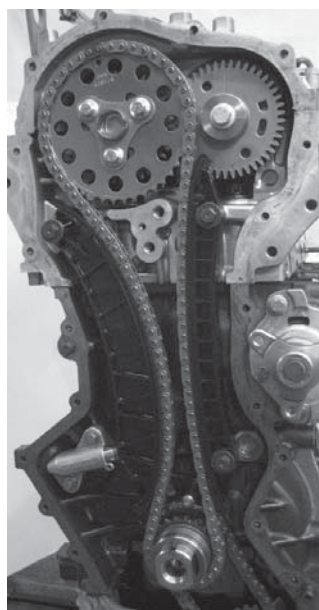
Kit contents/spares

Item	Part Number	Description
1	AST4975T8	Chain Tensioner Locking Pin
2	AST4976	Crankshaft Pulley Holding Tool
3	AST4977	Crankshaft Locking Pin
4	AST4978	Camshaft Gear Alignment Fixture
5	AST4979	Camshaft Setting Tool
6	AST3032-20	Auxiliary Belt Tensioner Locking Pin
-	AST4975-84	Case + Insert

AST4975 Diesel Engine Setting/Locking Tool Kit

Comprises: **AST4975T8 Chain Tensioner Locking Pin**
AST4976 Crankshaft Pulley Holding Tool
(use with AST4939 Handle)

AST4977 Crankshaft Locking Pin
AST4978 Camshaft Gear Alignment Fixture
AST4979 Camshaft Setting Tool
AST3032-20 Auxiliary Belt Tensioner Locking Pin



The Renault 2.0dCi (M9R) common rail diesel is a twin camshaft 16v. engine.

The exhaust camshaft is driven directly from the crankshaft by a timing chain and has a front camshaft sprocket with a gear behind it.

The inlet camshaft is driven from the exhaust camshaft, via gears at the front of the camshafts.

The inlet camshaft has a scissor gear (wear compensation gear), which connects to the exhaust camshaft gear.

Timing applications on this engine require removal of the timing chain front cover plate, exposing the camshaft sprocket/gears, crankshaft gear and timing chain/tensioner.

If the specific repair /overhaul application being carried out allows the engine to remain in the vehicle, then it will be necessary to support the engine and remove the engine mounting bracket and torque stabiliser.

Checking valve timing

In order to remove the front cover plate the engine oil must be drained and the auxiliary belt and front pulleys removed.



Release the 3 bolts of the coolant pump pulley (do not remove the pulley at this stage).

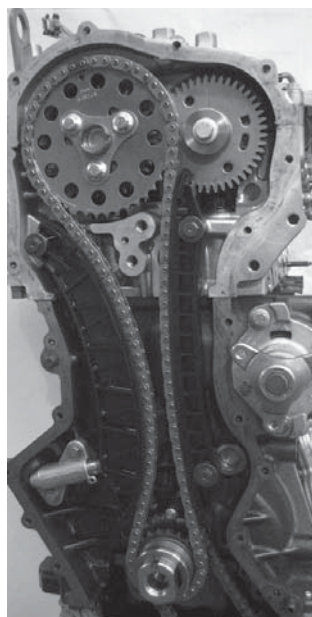
Turn the auxiliary belt tensioner roller **clockwise** and 'lock' using AST3032-20 Tensioner Locking Pin. Remove the auxiliary belt.

Turn the tensioner roller **clockwise** and remove the Locking Pin. Remove the belt tensioner unit and the coolant pump pulley.

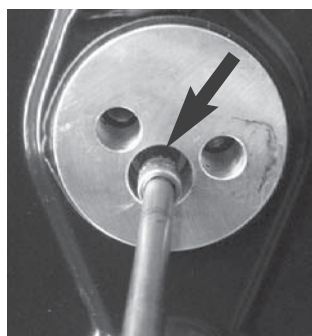


AST4976 Crankshaft Pulley Holding Tool
(use with AST4939 Handle – Associated Tool –not in kit)

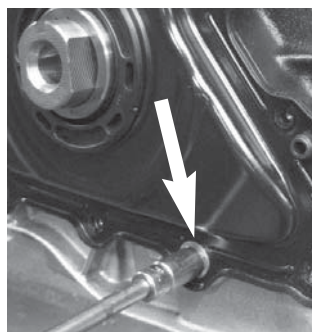
Using AST4976 Crankshaft Pulley Holding Tool and a suitable handle, such as AST4939, to counter-hold the crankshaft pulley, release the centre bolt and remove the bolt, pulley and spacer sleeve.

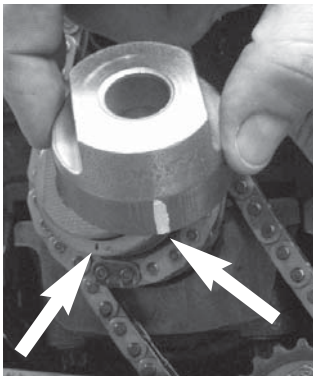


Remove the timing chain front cover plate to provide access to the camshaft gears and timing chain/chain tensioner.



NOTE: When removing the front cover plate there is a bolt located behind the engine mounting. There is also a large bolt (larger than the other cover plate bolts) on the sump.

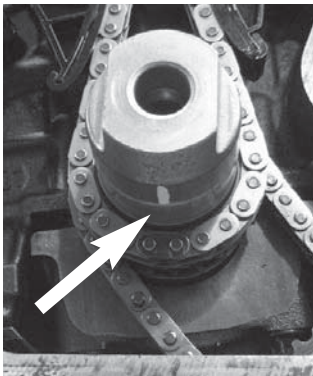




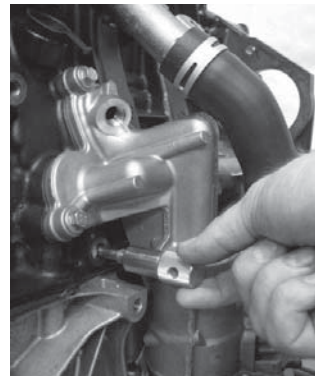
Rotate the engine to TDC No.1 cylinder position.

NOTE: In order to turn the crankshaft it will be necessary to install the crankshaft spacer sleeve on to the end of the crankshaft and use Tool AST4976.

The spacer sleeve will cover the crankshaft gear timing mark, therefore paint a mark on the sleeve aligned with the crankshaft gear timing mark to assist in identifying crankshaft positioning.

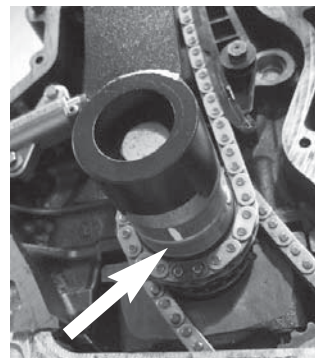
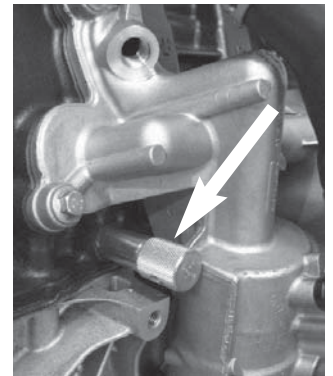


When the engine is a TDC No.1 cylinder the crankshaft gear timing mark is at the **6-o-clock** position and the inlet camshaft gear timing mark is at **12-o-clock**.

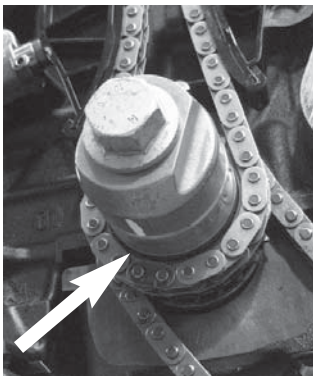


Insert AST4977 Crankshaft Locking Pin

IMPORTANT: Ensure the Locking Pin is fully screwed in to the hole in the engine block.

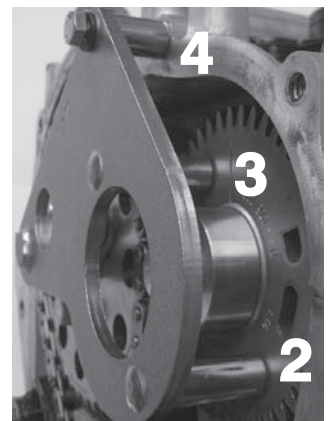
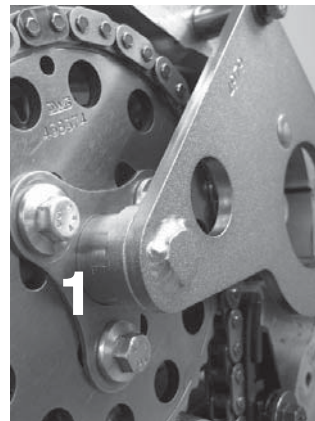


Turn the crankshaft **anti-clockwise** until the 'paint mark' on the spacer sleeve is in the **6-o-clock** position. The AST4977 Crankshaft Pin will 'lock' the engine at this point.



AST4977 Crankshaft Locking Pin

Rotate the crankshaft, using AST4976 Holding Tool, to move the 'paint mark', on the crankshaft spacer sleeve (crankshaft gear timing mark), to the **7-o-clock** position.

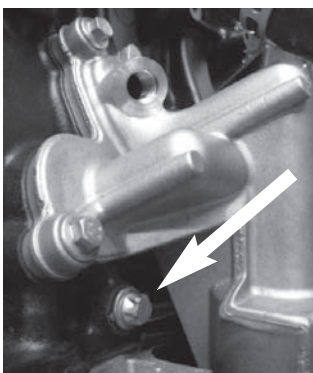


AST4979 Camshaft Setting Tool

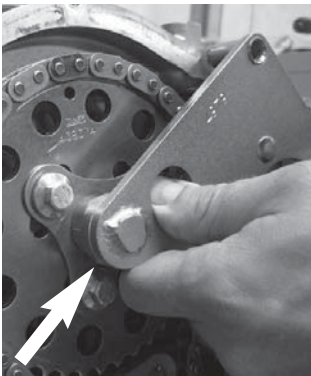
The AST4979 Camshaft Setting Tool has 4 location points – (1) the exhaust camshaft sprocket centre slot, (2 and 3) the inlet camshaft gear (two holes). (4) the retention bolt to the cylinder head.

The Tool is used to both check and adjust camshaft / valve timing position.

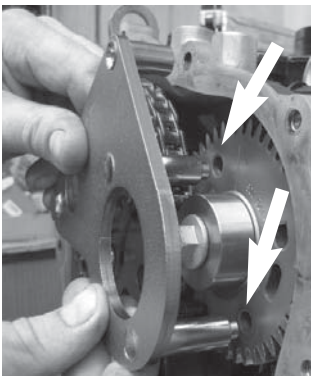
IMPORTANT: The Camshaft Setting Tool **MUST BE** able to achieve location at all 4 points simultaneously, for timing to be correct.



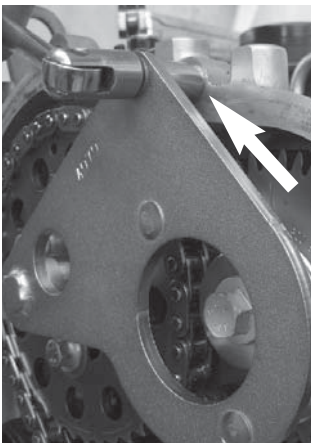
Remove the bolt from the hole in the engine block which accepts the AST4977 Crankshaft Locking Pin.



To check that valve timing is correct - fit AST4979 Setting Tool in to the slot at Point 1 (exhaust sprocket centre slot).



Whilst located in this slot (Point 1) fit the two pillars of the Tool in to the two holes in the inlet camshaft gear (Points 2 and 3).



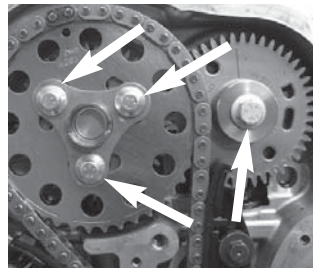
Finally, secure the Setting Tool to the cylinder head at Point 4, with the bolt provided in the kit.

If all 4 location points are achieved, then the valve timing is correct. If not, then valve timing adjustment will be necessary.

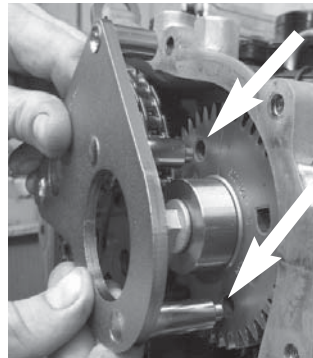
Valve timing adjustment

The following procedure covers valve timing adjustment and also applies to setting up the valve timing when installing the camshafts, gears after cylinder head overhaul etc.

Ensure the engine / crankshaft is at TDC No.1 cylinder and that AST4977 Crankshaft Locking Pin is correctly inserted and the crankshaft is 'locked' in position.

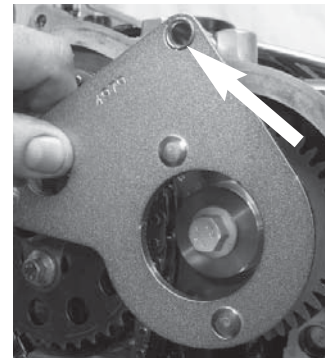


Slacken the centre bolt (x1) of the inlet camshaft gear. Slacken the 3 bolts of the exhaust camshaft front sprocket.



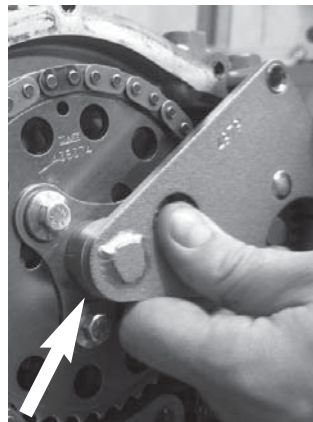
1st - position the inlet camshaft gear:

Fit AST4979 Camshaft Setting Tool in to the 2 holes (Points 2 and 3) in the inlet camshaft gear and rotate the Setting Tool to align the Tool to the bolt hole (Point 4) in the cylinder head. **(IMPORTANT:** At this stage the Setting Tool is not inserted in to the exhaust camshaft sprocket slot (Point 1).

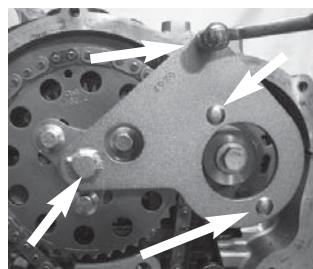


2nd – position the exhaust camshaft sprocket:

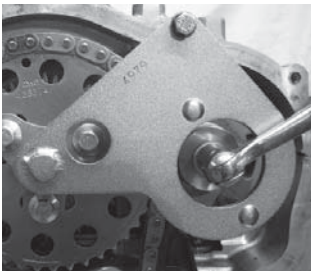
Remove the Camshaft Setting Plate from the inlet camshaft gear and fit it in to the slot in the exhaust camshaft sprocket (Point 1). Rotate the Setting Tool to align the Tool to the bolt hole (Point 4) in the cylinder head. **(IMPORTANT:** At this stage the Setting Tool is not inserted in to the inlet camshaft gear holes (Points 2 and 3).



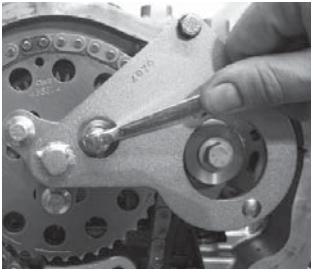
Finally – insert Setting Tool to both camshafts and secure to the cylinder head:



Fit the AST4979 Camshaft Setting Tool in to both the exhaust camshaft sprocket slot (Point 1) and the inlet camshaft gear – 2 holes (Points 2 and 3), and secure the Tool to the cylinder head (Point 4) using the bolt provided.



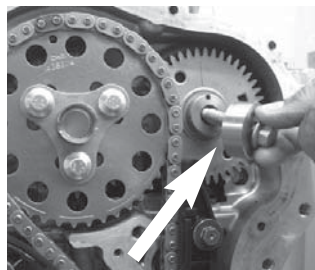
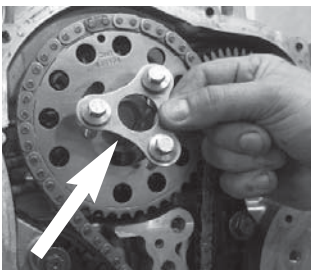
Replace the camshaft sprocket/gear bolts and tighten the new bolts to the specified torque.



Procedure for removing / re-fitting the camshaft gears / timing chain after overhaul applications on camshafts, cylinder head etc.

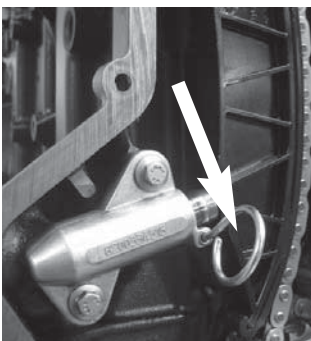
Dismantling / Removal of gears

Ensure the engine / crankshaft is at TDC No.1 cylinder and that AST4977 Crankshaft Locking Pin is correctly inserted and the crankshaft is 'locked' in position
Slacken and remove the 3 bolts retaining the exhaust camshaft sprocket and remove the triangular plate.



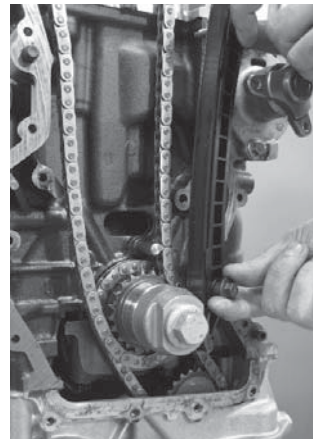
Slacken and remove the centre bolt and cover from the inlet camshaft gear.

AST4975T8 Timing Chain Tensioner Locking Pin



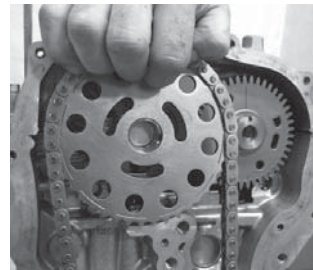
Push in the timing chain tensioner plunger and insert AST4975T8 Locking Pin to 'lock' the plunger in a retracted position.

Remove the chain tensioner unit.

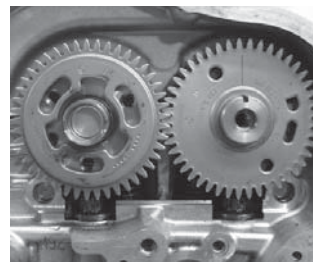


Remove the chain guide rails – slacken and remove the upper and lower bolts from the non-tensioned side rail and the upper bolt from the tensioned side rail.

Remove the crankshaft spacer sleeve.

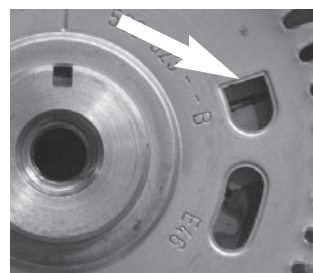


Remove the exhaust camshaft sprocket, crankshaft gear and timing chain as one assembly and in one operation.

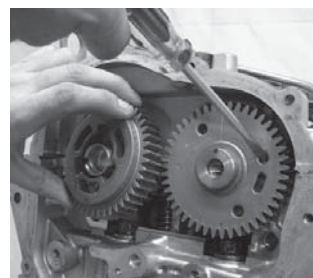


The exhaust camshaft gear and inlet camshaft gear will now be exposed on the end of the camshafts.

NOTE: The inlet camshaft gear is a scissor gear (wear compensation gear) which is a spring loaded, double gear, configuration.

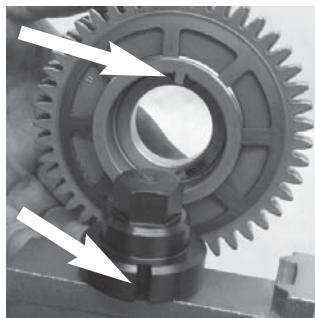


Insert a suitable sized screwdriver in to the window in the inlet camshaft gear and apply leverage to turn the lower section of the scissor gear to release tension off the gear teeth.



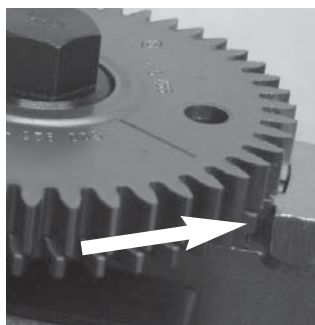
Maintain the leverage and remove the exhaust camshaft gear and then remove the inlet camshaft gear.

Re assembly



AST4978 Camshaft Gear Alignment Fixture

Fit AST4978 Gear Alignment Fixture in to a suitable bench vice



Place the inlet camshaft gear on to the Fixture (timing mark visible), with the keyway in the gear located on to the spindle of the Fixture and the gear teeth located in the base of the Fixture.



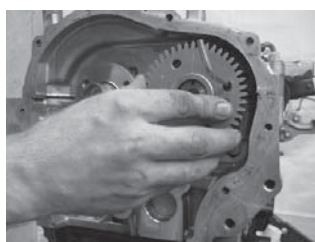
Using a spanner, turn the spindle **anti-clockwise** to align the top and bottom sets of gear teeth.

Insert the 4mm. Spacer Key provided, in to the window in the gear to maintain the aligned position of the scissor gear teeth.



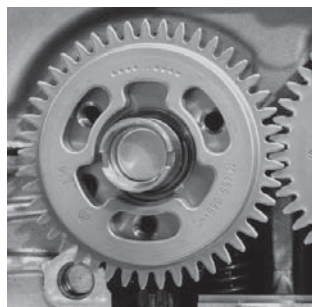
Remove the inlet camshaft gear from AST4978 Fixture ensuring that the Spacer Key remains in place in the gear window.

Ensure the crankshaft is locked at TDC with AST4977 Locking Pin
NOTE: Check crankshaft is locked correctly by trying to turn it in an **anti-clockwise** direction. It should not be possible to turn it.

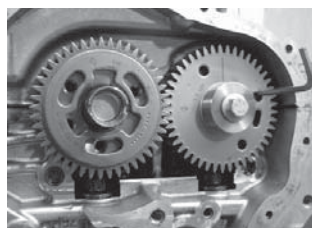


Install the inlet camshaft gear and spacer and screw in a new bolt finger-tight only (do not fully tighten bolt at this stage).

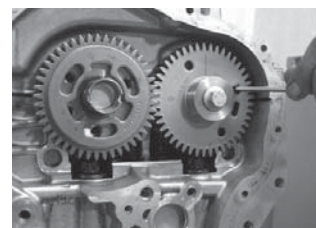
NOTE: The timing mark and keyway of the gear should be in the **12-o-clock** position.



Install the exhaust camshaft gear ensuring that the bolt holes are positioned in the centre of the elongated holes in the gear and that the gear teeth mesh together with the gear teeth of the inlet camshaft gear. .

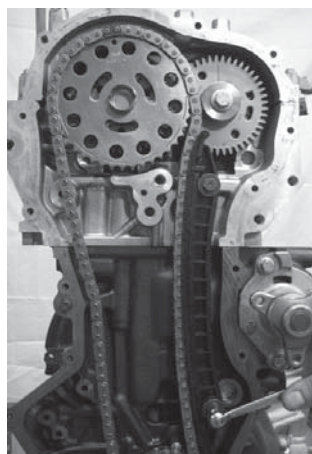


Pull out the Spacer Key from the inlet camshaft gear allowing the teeth of the scissor gear to activate.

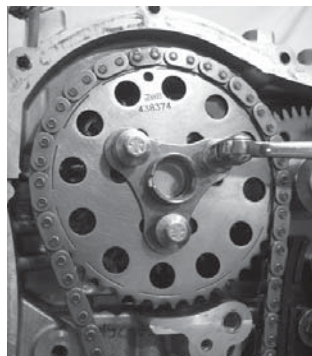


Prepare the assembly of the crankshaft gear, timing chain and exhaust camshaft sprocket ensuring that the coloured links on the chain are positioned on the timing marks of the sprocket / gear and install the assembly on to the engine.

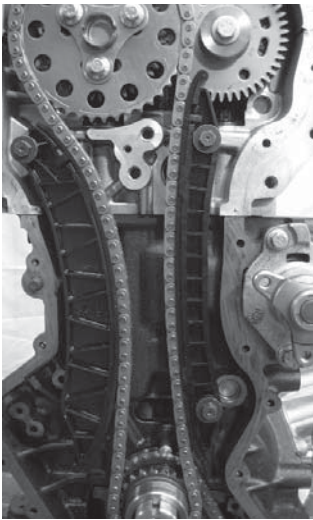
NOTE: The crankshaft gear has a keyway location but the camshaft sprocket is 'free' on the end of the camshaft.



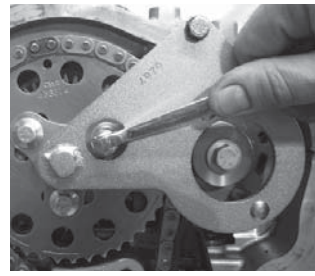
Install the chain guide rail on the non-tensioned side using 2 new bolts and tighten



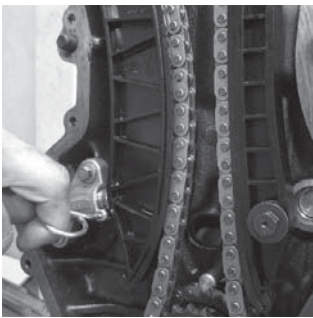
Install the triangular plate onto the exhaust camshaft sprocket using 3 new bolts and tighten finger-tight only.



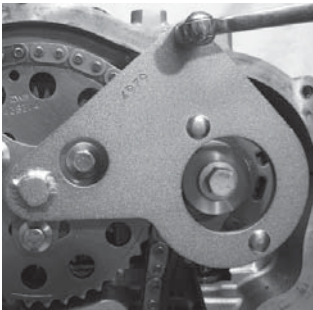
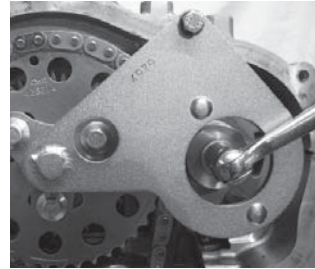
Install the chain guide rail on the tensioned side using a new bolt and tighten.



Tighten the exhaust camshaft sprocket bolts (x3) to 10Nm. + 40 degrees, and then tighten the inlet camshaft gear bolt to 20Nm. + 35 degrees.



Install the chain tensioner and pull out Pin AST4975T8 to activate the plunger. Ensure the plunger is in contact with the chain guide rail.



Check that the exhaust camshaft sprocket and inlet camshaft gear are positioned correctly by installing AST4979 Setting Tool and ensuring it can be secured to the cylinder head with the bolt provided – refer to “Adjusting valve timing”.



When the front cover is re-fitted, a new bolt must be used on the crankshaft pulley. This is tightened to 50Nm. + 85 degrees.



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AUTO SERVICE TOOLS

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